

**RESUME - STEPHEN B. WEINSTEIN** December 2005

Communication Theory & Technology Consulting LLC (a personal corporation)  
Adjunct Prof. Electrical Engineering, Columbia University

150 Woodland Avenue, Summit, New Jersey 07901  
tel: +1 (908) 522-1955 Email: sbw@cttcservices.com or s.weinstein@ieee.org

**PROFESSIONAL CAPABILITIES:**

Research and research management; graduate-level teaching; patent litigation consulting; conference organization; editing and writing. Expertise in broadband communications, wireless LAN systems, communication systems and protocols, information systems, and multimedia services and applications.

**EDUCATION:**

M.I.T.	BS	1960 (EE)
University of Michigan	MS	1962 (EE)
Univ. of California (Berkeley)	PhD	1966 (EE)

Carnegie Mellon University 5-week short course in computer science for engineers, 1992.

**POST-PhD EMPLOYMENT:**

Jan. 2002 to present: Consultant in **Communication Theory & Technology Consulting LLC** (www.cttcservices.com) and Adjunct Prof. of Electrical Engineering, Columbia University.

Activities: Expert consulting to major law firms on technical aspects of patent litigation cases. Instruction of university courses and short courses to both technical and nontechnical audiences. Most recent course (Fall 2005): Integrated Networking (Columbia University EE Dept.), an overview of the networks and technologies (e.g. modulation, Internet protocols & services, cable data and DSL systems, media streaming, QoS mechanisms) constituting the public infrastructure. I also collaborate with a colleague on research in wireless access to cable systems, and for one industrial client on optical/wireless integration.

Jan. 1994 to Sept. 2001: Fellow and Manager, Communications Technology, **NEC C&C Research Laboratories**, Princeton, New Jersey

Activities: Management of Communications Technology Area consisting of two departments: IP/Optical Networking Research, and Microwave and Signal Processing Research. Technical Manager of the IP/Optical Networking Department as well. Topics included DWDM switching/multiplexing technologies for optical networks, IP services creation in edge routers (leading to a demonstration at Telecom '99 in Geneva), and "Virtual Operator" wireless LANs.

Sept. 1984 to Dec. 1993 (retired): Department Head, **Bellcore (now Telcordia)**, Morristown, New Jersey

Exec. Dir., CPE Systems Research, Aug. 1993-Dec. 1993  
Exec. Dir., Systems Integration Research, Nov. 1989-Aug. 1993  
Div. Mgr., Multimedia Commun. Res. (earlier Network Services Res.), Sept. 1984-Nov. 1989

Activities: Investigation of multimedia, multipoint, personalized communications among heterogeneous networks, terminals, and applications. This included a research program on large-screen teleconferencing ("VideoWindow", which became an exhibit at the Smithsonian Institution), video/multimedia servers, desktop multimedia teleconferencing, integrated real-time and messaging services, hypermedia browsing, multimedia email, and ATM signaling. Designed and led a project to connect Morris County, N.J. public libraries to the Internet in 1993, the second public library system in the country (after Seattle) to offer Internet access.

May, 1979 to Aug., 1984: **American Express Company**, New York, N.Y.  
Vice President, Technology Strategy

Activities: Reviewed technical business proposals and advised senior management on communications and information systems questions. Comparative study of CATV and competing delivery media that led to publication of a book. Developed product concepts and cryptographic security mechanisms for "smart cards" with imbedded integrated circuits.

May, 1968 to May, 1979: **Bell Laboratories**, Holmdel, New Jersey  
Member of Technical Staff, Advanced Data Department.

Activities: Studies and invention in voiceband data communication including signal design, equalization, echo cancellation, and error-rate estimation. Invented the data-driven echo cancellation technique embodied in ITU-T Recommendation V.32 and realized in commercial modems. Did pioneering work on discrete multitone data transmission (DMT/OFDM), including first description of discrete Fourier transform (DFT) implementation.

Sept., 1973 to June, 1974: **Howard University**, Washington, D.C.  
Bell Laboratories Visiting Professor in electrical engineering.

Activities: Designed undergrad communications laboratory and experiments. Created a senior year communications course. Collaborated with a cardiologist on diagnosis of myocardial infarction from extended electrocardiograms.

Jan., 1967 to March, 1968: **Philips Research Labs**, Eindhoven, Netherlands  
Post-doctoral intern.

Activities: Radar detection studies.

## TEACHING EXPERIENCE:

Spring, 2002-Fall, 2005: Columbia University EE Dept.

Created or shared three courses:

- Communications Network (light technical) for School of Journalism graduate students.
- Resilient Networking (co-taught with a professor from the School of Business)
- Integrated Networking (for EE and CS grad students)

Fall, 1998: Princeton University EE Dept.

Created and taught a graduate course on "Software Foundations of Networking" bridging the EE/CS gap. Emphasis on CORBA and JAVA technologies. A half-day tutorial drawn from the course was offered at IEEE Globecom '99, Dec., 1999 and again at IEEE NOMS 2000, April, 2000.

Sept., 1994: "Intelligent Networks" half-day short course at NSA, Fort George Mead, Maryland, sponsored by Interdigital Communications, Inc.

Summer, 1993: "Data Communications" videotape short course, marketed by Bellcore's Licensing Division (with David Feldmeier and Charles Davin).

Sept., 1990 and May, 1992: "Video Applications and Delivery" segment of three-day short course on video perception, processing, and applications, under auspices of Rutgers University Extension (with Barry Haskell and Arun Netravali).

Fall, 1985 and Fall, 1986: "Stochastic processes and data communications" graduate course at Princeton University, from my own notes.

Spring, 1982: "Data Communications" graduate course at Polytechnic Univ.

May, 1978: "Voiceband Data Communications" 4-day short course under auspices of the Dept. of EE, Technion, Haifa, Israel (with Jack Salz).

Sept. 1973-June 1974: One year residence at Howard University, Washington, DC as Bell Labs Visiting Professor. Taught junior and senior year courses on electronics, signal theory and statistical communication theory.

#### **RECENT TALKS AND CONFERENCE ACTIVITIES:**

May 17, 2005: Organized and chaired IEEE ICC 2005 Business Application Session on "Broadband Access Networks: Wireless Access Alternatives", Seoul, Korea.

October 27, 2004: Invited keynote lecture on "New trends toward next-generation networks" at IEICE (the IEEE of Japan) 17<sup>th</sup> Communication Systems Workshop, Lake Akan, Hokkaido, Japan.

May 2004: IEEE CAS 6th Circuits and Systems Symposium on Emerging Technologies: Frontiers of Mobile and Wireless Communication, Shanghai, China, Plenary lecture on "Future Wireless Networks and R&D Agendas"

March 2004: IEEE Wireless Communications & Networking Conference, Atlanta, GA. Co-authored paper on "Multi-user wireless access to a digital cable system" (with J. Lechleider).

#### **HONORS AND AFFILIATIONS:**

Fellow, IEEE (1984), "For contributions to the theory and practice of voiceband data communications, and to IEEE publications activities". Awardee, IEEE Centennial Medal (1984) and Millenium Medal (2000). Member, Sigma Xi.

Honorary Member, Russian A.S. Popov Society of Radioengineering, Electronics, and Communications (2000)

#### **PROFESSIONAL ACTIVITIES:**

2006-2007: Chief Technology Officer of the IEEE Communications Society, responsible for advancing the Society's electronic services to its 40,000 members.

May-June, 2004. Co-Program Chair, IEEE CAS 6th Circuits and Systems Symposium on Emerging Technologies: Frontiers of Mobile and Wireless Communication, Shanghai, China

March, 2004. Program Chair, IEEE Wireless Communications & Networking Conference, Atlanta, GA.

2004: Member IEEE Fellow Committee and IEEE Technical Activities Board Management Committee

2004-2005: Member IEEE Nominations & Appointments Committee  
Member IEEE Technical Activities Board Nominations & Appointments Committee  
Member IEEE Communications Society Staff & Facilities Committee

IEEE Communications Society Director of Marketing

2002-2003: Member IEEE Board of Directors (elected by members of IEEE Communications Society)

1996-1997: IEEE Communications Society President

[I have held many IEEE Communications Society positions held over the years, including Dir. of Publications, VP-Technical Activities and Ed. in Chief of IEEE Communications Magazine.]

1999-2001: First Editor in Chief of the Journal of Communications and Networks (JCN), an international English-language technical journal of the Korea Institute of Communication Sciences, technically cosponsored by the IEEE Communications Society.

2000: Co-Chair of IEEE NOMS (Network Operations and Management Systems) 2000, Honolulu, April 2000. Designed and implementing a wired/wireless, transparent access, multimedia streaming services network offered to attendees bringing their own laptops.

1999: Co-Chair of IEEE/Popov Workshop on Internet Technologies and Services, held Oct. 25-28 in Moscow. [Jointly sponsored by the IEEE Communications Society, IEEE Region 8 (Europe, ME, Africa) and the Russian Popov Society].

General Chair of OpenArch '99, a conference on open architectures for network control and management held in conjunction with IEEE Infocom '99, New York City.

Program Chair of the IEEE CAS/COM Workshop on High-Speed Data in Access Networks, held July, 1999 in Princeton. [Jointly sponsored by the IEEE Circuits and Systems and the IEEE Communications Societies.]

1998: Co-Guest Editor of IEEE Communications Magazine Feature Topic Issue on Programmable Networks, October, 1998.

1997-98 Co-founder of the IEEE P1520 Standards Working Group on Programming Interfaces for Networks.

1996-97: Member National Research Council Steering Committee on the "Every Citizen Interface to the NII". Contributed material on communications to the NRC's book, More Than Screen Deep, published in 1997.

1995-96: Member National Science Foundation Blue Ribbon Review Board for Engineering Research Center proposals.

#### **PUBLICATIONS** (papers and articles) beginning with the oldest:

1. "Analysis of asynchronous time multiplexing of speech sources", IRE Trans. on Commun. Syst., vol. CS-10#4, Dec., 1962 (with T.G. Birdsall and M.P. Ristenbatt).
2. "Optimum radar antenna gain patterns for attenuation of fixed background clutter", Philips Research Reports, vol. 22, pp. 568-576. 1967.
3. "The likelihood ratio for a radar system with feedback", IEEE Trans. on Infor. Theory, vol. IT-14 #5, May, 1968 (correspondence).
4. "The white noise approximation", IEEE Trans. on Comm. Tech., vol. COM-17 #1, Feb., 1969.
5. "Estimation of the probability of a rare event from limited knowledge", Proc. NEC, vol. 25,

pp. 424-428, 1969.

6. "A burst trapping code for feedback communication systems", Proc. Int. Telemetry Conf., Los Angeles, vol. VI, pp. 333-336.
7. "In Galois fields" (poem), IEEE Trans. on Infor. Theory, vol. IT-17 #2, Mar., 1971 (corresp.)
8. "Data transmission by frequency division multiplexing using the discrete Fourier transform", IEEE Trans. on Comm., vol. COM-19 #5, Oct. 1971 (with P.M. Ebert).
9. "Estimation of small probabilities by straight line extrapolation of the tail of a probability distribution function", IEEE Trans. on Comm., Special Issue on Signal Processing for Digital Commun., vol. COM-19 #6, part 1, Dec., 1971.
10. "Theory and application of some classical and generalized asymptotic distributions of extreme values", IEEE Trans. on Infor. Theory, vol. IT-19 #2, March, 1973.
11. "Simultaneous two-way data transmission over a two-wire circuit", IEEE Trans. on Comm., vol. COM-21 #1, Feb., 1973 (with V.G. Koll).
12. "On the selection of a two-dimensional signal constellation in the presence of phase jitter and Gaussian noise", Bell System Tech. Jour., July-Aug., 1973 (with G.J. Foschini and R.D. Gitlin).
13. "Inband signal generation of synchronous linear data signals", IEEE Trans. on Comm., vol. COM-21 #5, Oct., 1973 (with I. Kalet).
14. "Optimization of two-dimensional signal constellations in the presence of Gaussian noise", IEEE Trans. on Comm., vol. COM-22 #1, Jan., 1974 (with G.J. Foschini and R.D. Gitlin).
15. "Generation of linear and nonlinear synchronous data signals by digital echo modulation in a time-varying transversal filter", IEEE Trans. on Comm., vol. COM-24 #1, Jan., 1976.
16. "A first look at the application of signal extraction techniques to the analysis of body surface potential maps", IEEE Trans. on Biomedical Eng., vol. BME-23 #3, May, 1976 (with E. Fischmann, E. Matthews, and M. McNeel). A shorter version also appears in Advances in Electrocardiology, Karger (Switzerland), 1978.
17. "Optimized detection of quantized PAM data signals", IEEE Trans. on Comm., vol. COM-25 #12, Dec., 1976 (with G.J. Foschini and R.D. Gitlin).
18. "New echo cancellation techniques for two-way data transmission on a two-wire line", Proc. 1976 Nat. Telecomm. Conf., Dallas, Dec., 1976 (with K.M. Mueller and D.D. Falconer).
19. "Echo cancellation in the telephone network", IEEE Comm. Society Magazine, Jan., 1977.
20. "A passband data-driven echo canceller for full-duplex transmission on two-wire circuits", IEEE Trans. on Comm., vol. COM-25 #7, July, 1977.
21. "The effects of large interference on the tracking capability of echo cancellers", IEEE Trans. on Comm., vol. COM-26 #6, June, 1978 (with R.D. Gitlin).
22. "On the required tap-weight precision for digitally implemented adaptive equalizers", Bell Syst. Tech. Jour., vol. 58 #2, Feb., 1979 (with R.D. Gitlin).

23. "Modulation and demodulation techniques for voicegrade data transmission", Proc. 1980 Inter. Conf. on Comm., Seattle, June, 1980.
24. "Sample-based scrambling techniques for voice security", Proc. 1980 Int. Conf. on Comm., Seattle, June, 1980.
25. "Fractionally-spaced equalization for data communications", Bell Syst. Tech. Jour., vol. 60 #3, March, 1981 (with R.D. Gitlin).
26. "The tap leakage algorithm: an algorithm for the stable operation of a digitally implemented fractionally spaced adaptive equalizer", Bell Syst. Tech. Jour., vol. 61 #10, Oct., 1982 (with R.D. Gitlin and H.C. Meadors; winner of the 1982 BSTJ "best paper" award in its category).
27. "A perspective on financial industry networking", Jour. of Telecomm. Networks, Dec., 1982.
28. "The smart credit card: the answer to electronic shopping", IEEE SPECTRUM, Feb., 1984.
29. "Communication needs of the card industry", Proc. IEEE Globecom, reprinted in the July, 1984 issue of IEEE Comm. Magazine and in the Sept., 1984 issue of Telephone Engineer and Manager.
30. "Personalized communications in the intelligent, wideband network", Proc. 1986 Zurich Inter. Seminar on Digital Communications, April, 1986.
31. "Communications in the coming decades", IEEE SPECTRUM, Nov., 1987.
32. "On the cutting edge of tomorrow's technology", USA Today Mag., Sept., 1989, pp.30-33.
33. "Beyond the telephone: new ways to communicate", The Futurist, Nov.-Dec., 1989, pp. 8-12 (with P. Shumate).
34. "Transition to Broadband: Issues and Challenges", Nat. Comm. Forum, Chicago, Oct., 1990.
35. "A multi-network research testbed for multimedia communications services", Proc. IEEE ICC 91, Denver, June, 1991 (with A. Albanese, H. Bussey, and R. Wolff).
36. "A store and forward architecture for video on demand service", Proc. IEEE ICC 91, Denver, June, 1991 (with A. Gelman, H. Kobrinski, L. Smoot, M. Fortier & D. Lemay).
37. "Communication session management for distributed multimedia applications", Proc. 1992 Inter. Zurich Seminar on Digital Comm., Mar. 16-19, 1992, pp. 95-101 (with H. Bussey).
38. "A video on demand server architecture", Proc. 1993 SCTE New Technologies Conference, New Orleans, Jan., 1993.
39. "Dual-media messaging with screen telephones on the telephone network", Proc. ICC 93, Geneva, June, 1993 (with B. Schwartz).
40. "The Internet multicast from the International Telecommunications Symposium in Rio de Janeiro", IEEE Commun. Mag., Jan. 1995 (with L. de Moraes).
41. "Efficient capacity allocation in Hybrid Fiber/coax networks", Proc. IEEE Globecom '95, Singapore, November, 1995 (with A. Kolarov)
42. "The role of satellite communications in Internet multimedia applications", Proc. Internat.

Conf. on Satellite Communications (Popov Society/IEEE), Moscow, Russia, Sept. 1996.

43. "A CORBA foundation for integrated control and management" (with M. Suzuki, S. Rao, M. Greenberg), Proc. OpenSig '97, Cambridge, U.K., April, 1997.
44. "A CORBA-based architecture for QoS-sensitive networking", Proc. International Zurich Symp. on Broadband Communications, Feb., 1998 (with M. Suzuki, J-P. Redlich and S. Rao).
45. "Distributed object technology for networking", IEEE Communications Magazine, Oct., 1998 (with M. Suzuki and J-P. Redlich).
46. "The IEEE P1520 standards initiative for programmable network interfaces" (with 8 other authors), IEEE Communications Magazine, Oct., 1998.
47. "The Global Internet: A new perspective on broadband access to the Internet", Proc. IEEE Globecom '98, Sydney, November, 1998 (with R. Dighe and M. Suzuki).
48. "Implementing virtual networks in the Internet", Proc. 1999 IEEE Second Conf. On Open Architectures and Network Programming, 26-27 March, 1999.
49. "IP services creation in an intelligent router", Proc. First IEEE/Popov Workshop on Internet Technologies and Services, Moscow, Oct. 25-28, 1999.
50. "The wired/wireless, instant access, data and media trial at IEEE NOMS 2000", IEEE Commun. Magazine, Dec. 2000, co-authored with J-P. Redlich, Syed Ali, and Wolf Mueller.
51. "Public access mobility LAN: extending the wireless Internet into the LAN environment", IEEE Wireless Magazine, June, 2002, co-authored with JJ. Li, J. Zhang, & N. Tu.
52. "Multi-user wireless access to a digital cable system" (with J. Lechleider), Proc. IEEE Wireless Commun. & Networking Conf., March, 2004.

#### **BOOKS AND BOOK CHAPTERS:**

The Multimedia Internet, (Springer, April 2005, ISBN 0-387-23681-3). A 400-page light technical review of the communications and networking, media compression, and Internet protocols and services underlying voice/video/graphics communication in the Internet.

Data Communication Principles, co-authored with J.F. Hayes and R.D. Gitlin, Plenum, 1992, ISBN 0-306-43777-5. A comprehensive, 730-page textbook on physical-level data communications.

"ISDN Multimedia Applications", a chapter in ISDN Systems, P.Verma, Ed., Prentice-Hall, 1990.

"Voiceband Data Communications", a chapter in Encyclopedia of Telecommunications Academic Press, 1989.

Getting the Picture: A Guide to CATV and the New Electronic Media, IEEE Press, 1986, ISBN 0-87942-197-5. A light technical book touching also on programming and industry development.

#### **PATENTS:**

1. U.S. Patent #3,646, 518, March 3, 1972. "Feedback echo control system". (An error burst correcting technique in which an "echo" of a data block is imprinted on a later block.)

2. U.S. Patent #3,810,021, May 7, 1974. "Technique for inband generation of linear data signals", with I. Kalet. (Use of a time-variable transversal filter in which a variety of modulated data signals are produced by selection of tap-weight sequences.)
3. U.S. Patent #3,932,032, Jan. 13, 1976. "Synchronous system of visual image and digital sound recording and presentation". (A system for digital optical motion picture sound recording which eliminates the editing problems of other "single" systems. I wrote this patent with no assistance from a patent attorney.)
4. U.S. Patent #4,074,086, Feb. 14, 1978. "Joint adaptive equalization and echo cancellation for synchronous two-way data communication on a two-wire channel", with D.D. Falconer. (An approach to echo cancellation for full-duplex operation on dialed telephone lines.)
5. U.S. Patent #4,131,767, Dec. 26, 1978. "Independent echo cancellation for two-way data communication on a two-wire channel". (Interleaved symbol-interval cancelers, now the standard technique. Patent applications filed in 11 foreign countries.)
6. U.S. Patent #4,237,554, Dec. 2, 1980. "Coefficient tap leakage for fractionally-spaced equalization", with R.D. Gitlin and H.C. Meadors. (A technique for avoiding unreasonably large tap weights in fractionally-spaced equalizers.)
7. U.S. Patent #4,245,345, Jan. 13, 1981. "Timing acquisition in voiceband data sets", with R.D. Gitlin, E.Y. Ho, and H.C. Meadors. (Retention of tap weights and use of an initial dotting pattern for fast restart.)
8. U.S. Patent #4,253,184, Feb. 24, 1981. "Phase jitter compensation using periodic harmonically related components", with R.D. Gitlin. (Phase jitter compensation built up from components at power-line frequency and its harmonics.)
9. U.S. Patent #4,453,074, June 5, 1984. "Protection system for intelligent cards". (Protection against forgery of integrated circuit "smart cards" through software mechanism exploiting authentication property of public-key encryption.)
10. U.S. Patent #4,827,518, May 1, 1989. "Speaker verification system using integrated circuit cards", with T. Feustel, M. Glemboski, M. Ordun, and G. Velius. (A system using stored speech templates, in "smart cards", for authentication and voice control.)
11. U.S. Patent #5,341,474, Aug. 23, 1994, "Communications architecture and buffer for distributing information services", with A. Gelman, H. Kobrinski, L. Smoot.
12. U.S. Patent #5,371,532, Dec. 5, 1994, "Communications architecture and method for distributing information services", with A. Gelman, H. Kobrinski, L. Smoot. (A multimedia server downloading incremental segments to buffers at a serving office near the user.)
13. U.S. Patent #6,035,020, Mar. 7, 2000, "System for data traffic bypass of telephone switches" (with K. Miyahara). (Alternative use of a subscriber line for voice or data, directing modem signals to a data network instead of the voice switch, based on a dialing prefix.)

Patent applied for (with J. Lechleider) on a system for wireless access to cable systems.

#### PERSONAL INTERESTS:

Languages (Russian, Japanese, Spanish), travel, reading prose and poetry, cross-country and downhill skiing, music, digital photography.